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STMicroelectronics reveals advanced global-shutter image sensor for affordable, reliable driver-monitoring safety systems

ST's second-generation automotive global-shutter image sensor simplifies driver monitoring system (DMS) design, leveraging investment in advanced 3D-chip technology

Geneva, May 5, 2022 – STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronics applications, is enhancing vehicle safety with its latest global-shutter image sensors for driver monitoring systems (DMSs).

DMSs continually watch the driver's head movements to recognize signs of drowsiness and distraction, enabling systems in the vehicle to generate warnings that can preserve the safety of occupants. Traffic agencies estimate that about 95% of road-traffic accidents result from human error, many of which could be avoided using systems such as DMSs. With almost 19,000 accident fatalities in Europe in 2020¹, recently enacted legislation will mandate DMS for all new car platforms in Europe in 2024 and for existing model platforms in 2026. With traffic fatalities twice as high in the US², the National Transportation Safety Board (NTSB) has recommended DMS for all semi-autonomous vehicles.

“Drivers may not realize that they are unsafe to drive due to tiredness or distraction. DMS removes uncertainty by detecting the problem automatically, which protects all occupants as well as others traveling on the road,” said Eric Aussedat, Executive Vice President, Imaging Sub-Group General Manager, STMicroelectronics. *“Our latest global-shutter sensors deliver sensitivity and compactness, simplifying DMS hardware and reducing the overall system cost. This enables our customers and partners to deliver high-performing and reliable DMS systems reaching the legislation expectations.”*

The new global-shutter sensor, [VB56G4A](#), leverages ST's in-house investment in manufacturing advanced 3D-stacked back-side illuminated (BSI-3D) image sensors. These are more sensitive, smaller, and more reliable than conventional front-side illuminated (FSI) sensors typically used in first-generation DMSs.

¹ [European Transport Safety Council press release, June 16, 2021](#)

² [National Highway Traffic Safety Administration press release, March 2, 2022](#)

ST is supplying samples of its new sensor to lead customers now and mass production is scheduled for the beginning of 2023 for adoption in model year 2024 vehicles.

Further technical information:

Global-shutter sensor offers big advantages over rolling-shutter imagers. By simultaneously exposing all pixels to the image, a global-shutter sensor allows simple synchronization with NIR illumination, improving the illumination-subsystem power budget. Moreover, the new sensor achieves high Quantum Efficiency (QE), reaching 24% at 940nm near-infrared wavelength, with linear dynamic range up to 60dB. This enables a simple low-power, non-visible LED emitter to provide adequate illumination for the sensor. Operating outside the visible spectrum also ensures consistent response in day or night driving and in bright or overcast conditions.

The sensor's high QE, combined with a pixel size of just 2.6µm, helps optimize total power consumption and camera size. In addition, integrated automatic exposure control eases use and simplifies the application-software design by minimizing system interaction with the sensor.

The sensor also provides flexible operating modes that help optimize system features and performance. These include programmable sequences of 4-frame contexts, illumination control outputs synchronized with sensor integration periods, an input for an external frame-start signal, automatic dark calibration, dynamic defective-pixel correction, image cropping, and a mirror/flip-image readout.

External connections include eight programmable general-purpose I/O (GPIO) pins and a dual-lane MIPI CSI-2 transmitter interface operating up to 1.5 Gbps per lane. The sensor can operate at up to 88 frames per second (fps) at full resolution and typical power consumption is 145mW at 60 fps.

About STMicroelectronics

At ST, we are 48,000 creators and makers of semiconductor technologies mastering the semiconductor supply chain with state-of-the-art manufacturing facilities. An independent device manufacturer, we work with more than 200,000 customers and thousands of partners to design and build products, solutions, and ecosystems that address their challenges and opportunities, and the need to support a more sustainable world. Our technologies enable smarter mobility, more efficient power and energy management, and the wide-scale deployment of the Internet of Things and 5G technology. ST is committed to becoming carbon neutral by 2027. Further information can be found at www.st.com.

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